Laguna Honda Station, Twin Peaks Tunnel.

Geary Street Car Barn, Municipal Railway

The Hetch Hetchy Water and Power Project

The Municipal Railway

and Other Notable Civic Improvements of San Francisco

M. M. O'SHAUGHNESSY
CITY ENGINEER

OCTOBER, 1922

Hetch Hetchy Valley and Dam Site, Before Construction.

Mather Sawmill, Hetch Hetchy Project.

It is hereby declared to be the purpose and intention of the people of the City and County that its public utilities shall be gradually acquired and ultimately owned by the City and County.—(Charter of the City and County of San Francisco, Article XII, 1898.)

City and County of San Francisco

EXECUTIVE OFFICERS

MAYOR ..... JAMES ROLPH, Jr.

BOARD OF PUBLIC WORKS ..... Timothy A. Reardon, Daniel G. Fraser, Charles E. Stanton

CONSULTING ARCHITECT ..... John Reid, Jr.

CITY ENGINEER ..... M. M. O'Shaughnessy

LEGISLATIVE DEPARTMENT

Board of Supervisors

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October, 1922.

Hetch Hetchy Water Supply
and Power Project

While the average citizen knows that San Francisco is engaged in the construction of a municipal water supply, few realize that the Hetch Hetchy Project is of greater magnitude than any similar system in the United States except those of New York and Boston. The Hetch Hetchy Water Supply will furnish ultimately

400,000,000 Gallons of Pure Mountain Water

Daily to 4,000,000 People

in San Francisco and the other cities of the Metropolitan District surrounding the Bay.

In addition to furnishing this abundance of water so essential to both the physical and business welfare of the community, this same water passing through huge water-wheels installed in electric power plants will generate

200,000 Horsepower for General Use in

Central California,

thus providing cheap power, the second element necessary in the development of the industrial and agricultural regions tributary to San Francisco, the financial center.

The project takes its name from its principal reservoir site, Hetch Hetchy Valley, which is 18 miles on an air line northwest of Yosemite, and 168 miles from San Francisco.

Hetch Hetchy Reservoir and Dam

The Hetch Hetchy dam is now under construction and will be completed early in 1923. This dam in its initial development will be 226.5 feet high above the original stream bed, or 344.5 feet above the lowest point in its

foundation, and will contain 370,000 cubic yards of masonry. The reservoir will have capacity for storing 67 billion gallons of water. This is three times the capacity of the Spring Valley Water Company's Crystal Springs reservoir west of San Mateo.

In its ultimate development the crest of the dam will be raised 85.5 feet, making the total height of dam 430 feet, and giving a storage capacity of 113 billion gallons.

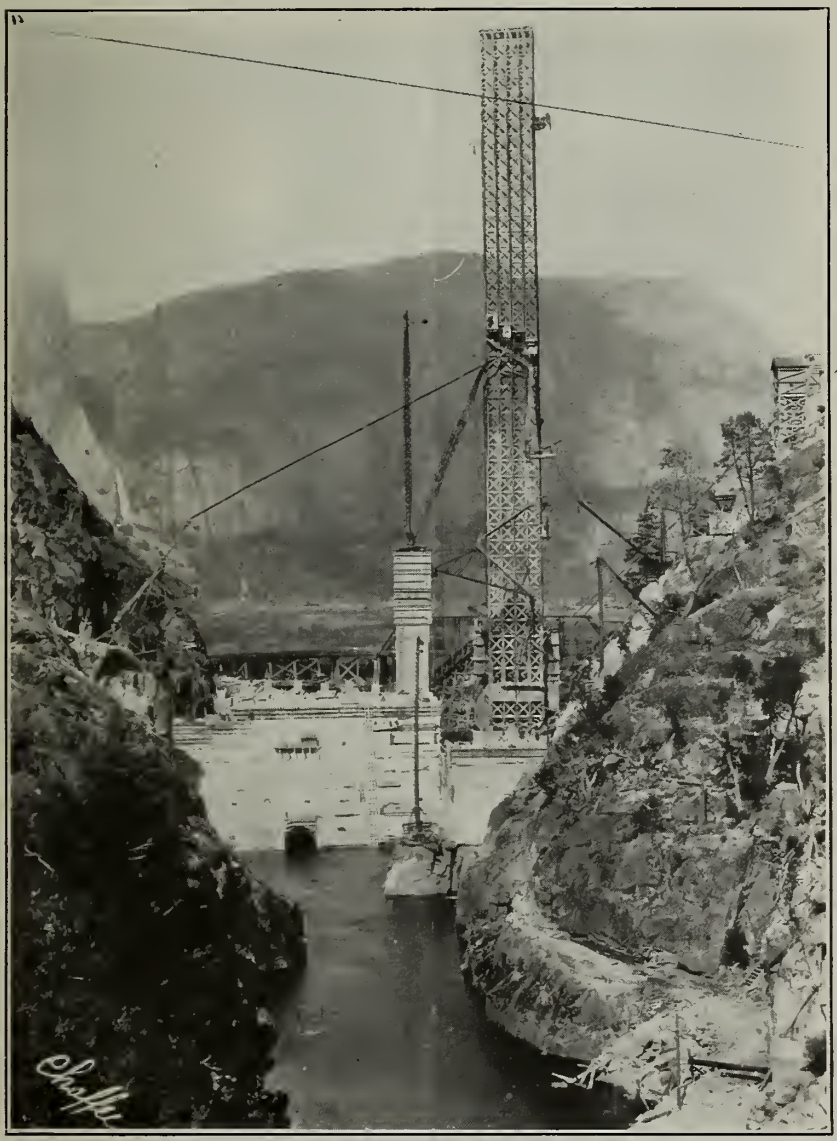
Lake Eleanor Reservoir and Dam

This reservoir will be second in importance to Hetch Hetchy. As it was necessary to store water to operate the construction power plant, mentioned later, through the dry season, a buttressed arch dam 70 feet high was built across the outlet of the lake, forming a 9 billion gallon reservoir. This is 45 per cent larger than San Andreas Reservoir of the Spring Valley Water Company, which lies west of Millbrae. Sometime in the future, when the City's growth demands it, a high dam will be built here to increase the storage capacity to over 50 billion gallons.

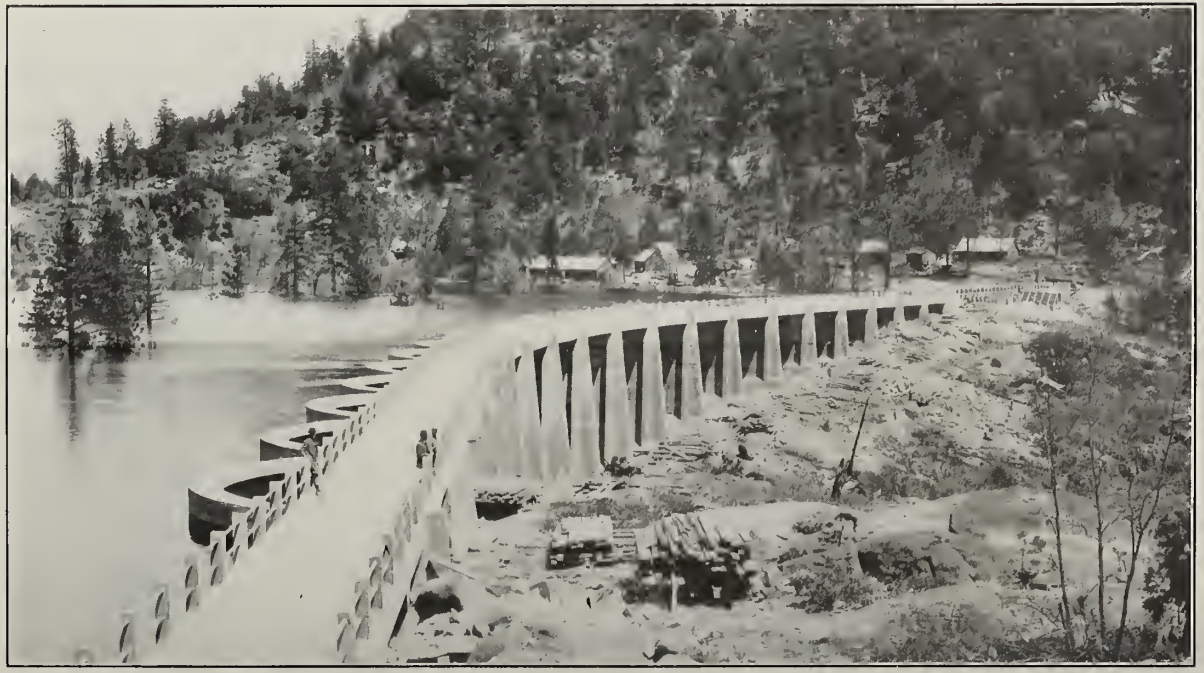
Mountain Division of the Aqueduct

The water released from Hetch Hetchy Reservoir will flow 12 miles down the Tuolumne River in the stream bed to Early Intake, where a diversion dam will turn it into the aqueduct. When the demand for power exceeds the Moccasin Creek power capacity, a tunnel will be constructed paralleling the river from Hetch Hetchy to Early Intake, and the fall of nearly 1200 feet will be utilized for developing 50,000 kilowatts additional.

The aqueduct from Early Intake to Priest is under construction and will be ready for service early in 1924. It includes 18.3 miles of tunnels, of a minimum size of 10 ft. 3 in. in height and width. About 11 miles of these tunnels will be lined with concrete.



General view of Hetch Hetchy Dam, April 24, 1922, showing the concrete in place at that date and a portion of the reservoir site in the background. The timber tower for placing concrete is 350 feet high. The bottom of the foundation excavation is 118 feet below the original stream bed. The river has been turned through a large tunnel penetrating the rock ridge at the right. The view is in the upstream direction.



Lake Eleanor Dam. The spring flood each year fills the reservoir behind the dam, and later the stored water is released to operate the power plant at Early Intake during the dry months.

Moccasin Creek Power Development

The 18.3 mile tunnel will discharge its water into the Priest Regulating Reservoir, from which the Moccasin Creek Power Plant will take water. This reservoir serves the purpose of allowing a varying rate of water consumption at the Power House with a uniform flow in the tunnel.

Between the reservoir and the power plant is a drop of about 1300 feet, affording opportunity to develop an average of 70,000 horsepower. This plant is to be built in 1923.

Aqueduct to the Bay Region

After passing the power plant, the water will enter another tunnel through the Sierra foothills, 17 miles in length, terminating at Oakdale Portal, in the rolling country just east of the San Joaquin Valley.

The great central San Joaquin Valley will be traversed by large steel pipes extending 45.2 miles from Oakdale Portal to Tesla Portal, eight miles southeast of Tracy.

The next division, 31.5 miles, will penetrate the Coast Range to the Irvington Gate House, all in tunnel except for 3200 feet of steel pipe crossing the valley of Alameda Creek.

Irvington Gate House

This will be the distributing point from which the water will be apportioned to the three main divisions of the Metropolitan District. The principal branch of the aqueduct will continue westward to the San Francisco peninsula; the second will extend northwesterly to the East Bay cities; and the third, southwesterly to San Jose.

From Irvington to San Francisco

This branch crosses the low land bordering the Bay of San Francisco with 20 miles of steel pipe, not far from the line of the existing pipe of the Spring Valley Water Company, crossing the southern arm of the bay at Dum-

barton, and ending in the hills west of Redwood City. Then comes 13 miles of tunnel running beneath the backbone of the ridge between the bay and the Spring Valley Lakes.

A two-mile steel pipe siphon will cross the low ground near Baden, and the final three miles of tunnel will bring the water into the City.

Crystal Springs Connection

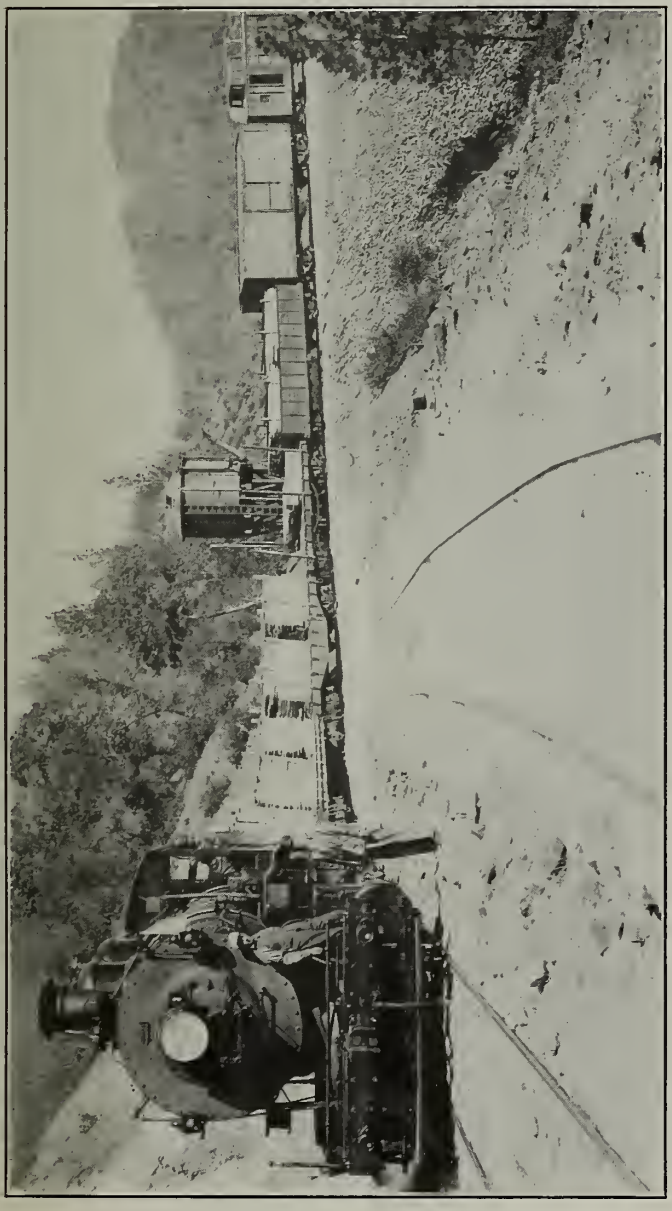
Near Redwood City, a connection will be made from the tunnel to the Crystal Springs Reservoir, so that Hetch Hetchy water can be stored in that reservoir. By raising the Crystal Springs dam 40 feet, the capacity of the reservoir can be more than doubled. The reservoir will then be kept full or nearly full at all times, so that if a break in the aqueduct should shut off the supply of Hetch Hetchy water, the stored water would last for many months, giving ample time for repairs. This is one reason why it is so important that the City should acquire the Spring Valley system. A large body of stored water close at hand is indispensable in a prudently designed water supply system for a large city and no economical reservoir sites exist on the peninsula except those already owned and controlled by the Spring Valley Water Company.

Amazon Reservoir

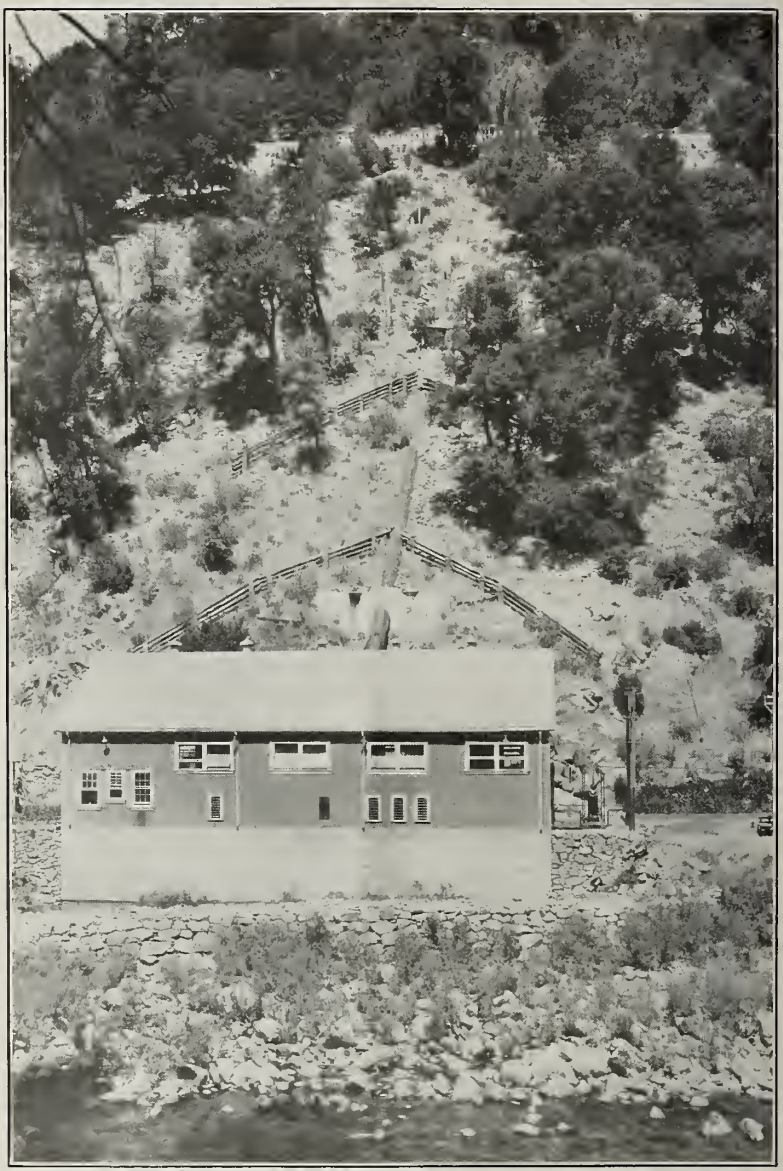
Land just inside the county line, east of Mission Street, has already been purchased on which to construct a receiving reservoir to hold 300,000,000 gallons of water at an elevation of 240 feet. From this level, nearly half of the total ultimate supply of the City can be distributed by gravity. The rest will be pumped to reservoirs at higher levels.

WHAT HAS ALREADY BEEN DONE

All construction work undertaken up to July, 1922, was concentrated in the Sierra Nevada region, to get the Moccasin Creek Power Plant in operation as early as possible. The revenue from power sales will pay a large part of



A freight train on the Hetch Hetchy Railroad near Priest.



Power House at Early Intake. Here water brought over three miles is made to generate 4400 horsepower to operate the construction machinery along thirty-four miles of transmission lines.

the charges which would otherwise have to be paid out of taxes, for interest and redemption of bonds. The people of San Francisco will begin to realize on their investment in this way in the earlier half of 1924.

Preliminary Work

As this division of the work is in rough mountain country, a great deal of preliminary work had to be done before construction of the main works could proceed. Many miles of roads were built to open up sections previously accessible only on foot or horseback.

Hetch Hetchy Railroad—To carry the 300,000 tons of freight required for the dams, aqueducts and power plants remote from previously existing railroads, the City built 68 miles of standard gauge railroad, starting at a junction with the Sierra Railway of California in the foothills, and following in a general way the line of the aqueduct to Hetch Hetchy. This road, in addition to carrying the City's freight, is operated as a common carrier, transporting lumber from new mills in the adjacent forests and other freight for the local inhabitants. Tourists desiring to see the great water supply works under construction are carried at established rates of fare.

Lower Cherry Power System—Electric power to operate construction machinery on the Hetch Hetchy work is furnished by a plant built by the City at Early Intake. The water is brought from Cherry River through a 3.3 mile aqueduct to a 345-foot power drop, to generate 4400 horsepower. The power is distributed to the work along 35 miles of 22,000 volt transmission lines.

Power generated in excess of the City's construction requirements is sold to the Pacific Gas and Electric Company. Over $200,000 has been received from such sales.

During the dry season the plant uses water stored at Lake Eleanor, as already mentioned.

Sawmill—Lumber for the work is furnished by a sawmill having a capacity of 25,000 board feet per day, located at Mather, nine miles from Hetch Hetchy.

Hetch Hetchy Dam

The initial dam is being built by the Utah Construction Company under contract. This work will be completed early in 1923, and will have cost over $6,000,000. The foundation has been excavated to sound bedrock, and over 325,000 cubic yards of concrete were placed to October 1, 1922. The remaining 45,000 yards will be completed about the beginning of 1923.

Aqueduct Tunnel Construction

The 18.3 miles in tunnels between Early Intake and Priest are in course of excavation at eight working faces, over fifteen miles having been bored. The division will be completed early in 1924, at a total cost of $8,000,000.

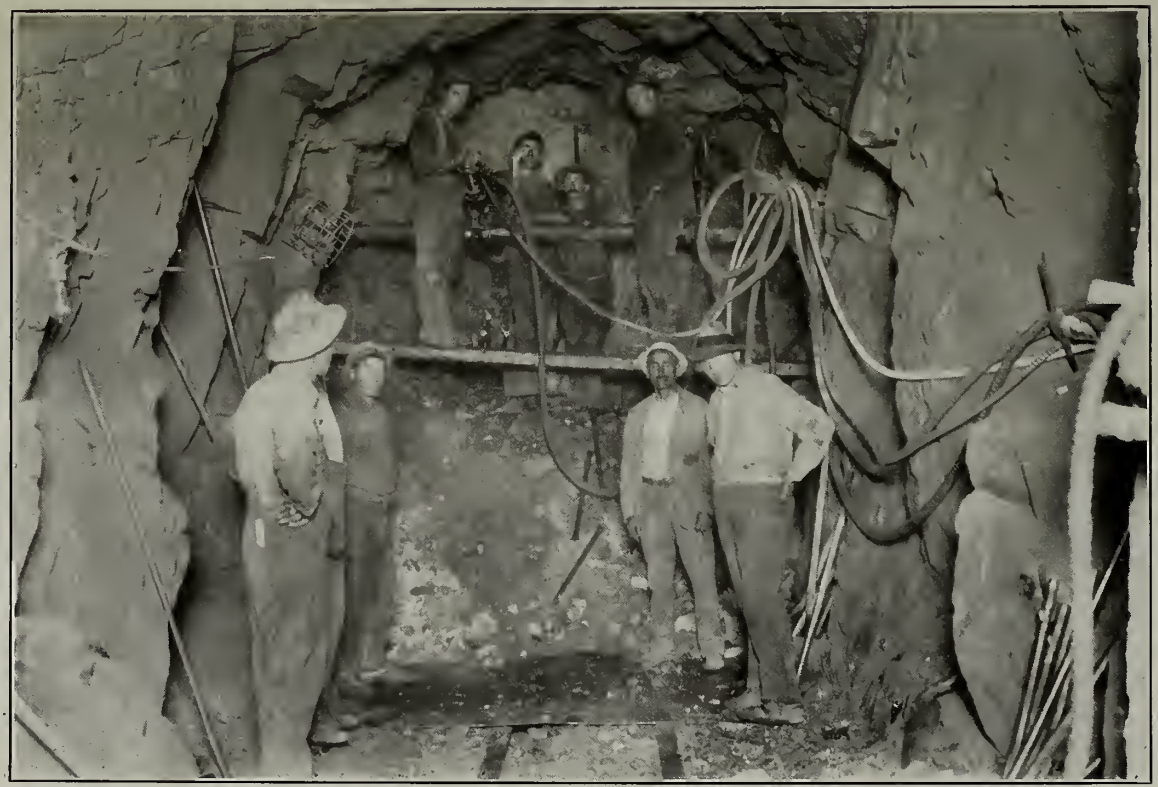
Priest Dam.

A forebay of 2,500 acre feet capacity for the Moccasin Creek Power Plant will be formed by the Priest Dam, now under construction. The dam will be 145 feet high. It will contain 800,000 cubic yards of earth and rock, a large part of which is being placed by hydraulic sluicing. It has a concrete core wall which insures absolute water tightness.

Moccasin Creek Power Development

Tunnel and Penstocks—The outlet tunnel from Priest Reservoir to the head of the penstocks is being excavated, 500 feet having been completed to date, and grading for the penstocks is in progress.

Power Plant Equipment—Contracts have been let for four 17,500 kilowatt electric generators driven by 25,000 horsepower water wheels, and for transformers and switchboards for the power plant. These items total about $900,000.



Excavating the Priest Heading of the Hetch Hetchy Aqueduct Tunnels.
This tunnel is 11 feet 3 inches in height and width. In August, 1921, this face, already over two miles in from the portal, was driven 776 feet further in, establishing a new record for aqueduct tunnels in America.

San Francisco Bay Development

Additional water, sufficient for the City's needs for ten years can be made available to San Francisco from Calaveras Reservoir of the Spring Valley Water Company, in Alameda County, within two years. Accordingly a 21-mile section of the Hetch Hetchy Aqueduct is to be constructed, extending from Irvington, Alameda County, through Newark and Redwood City to Crystal Springs Reservoir, to bring the Calaveras supply to the San Francisco side of the Bay. The water company will be permitted to use this aqueduct, paying the City interest on its cost at the rate of 5 per cent per annum.

One unit of this work, the Pulgas Tunnel, is already in course of construction, under contract, by Grant Smith & Co. The tunnel will be 1.7 miles long, 10 feet 3 inches in clear height and width, and lined with concrete. Six hundred feet has been excavated.

Work will shortly begin on 19 miles of steel pipe, five feet in diameter, and about 2,000 feet of submarine pipe across the navigable channel of the bay at Dumbarton.

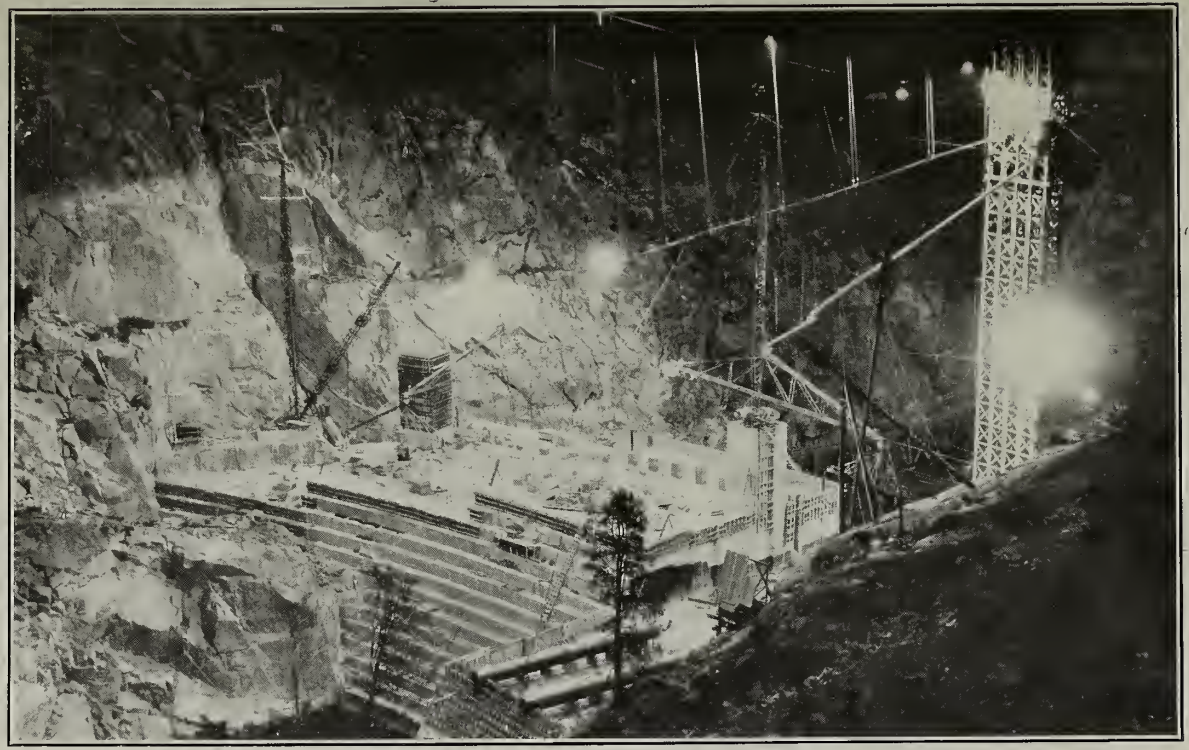
Financial

A $45,000,000 issue of 4½ per cent bonds was authorized by the voters of San Francisco in 1910 to finance the construction of the Hetch Hetchy works. The total cost to September 15, 1922, for preliminary work, land purchases, and actual construction, was $22,600,000.

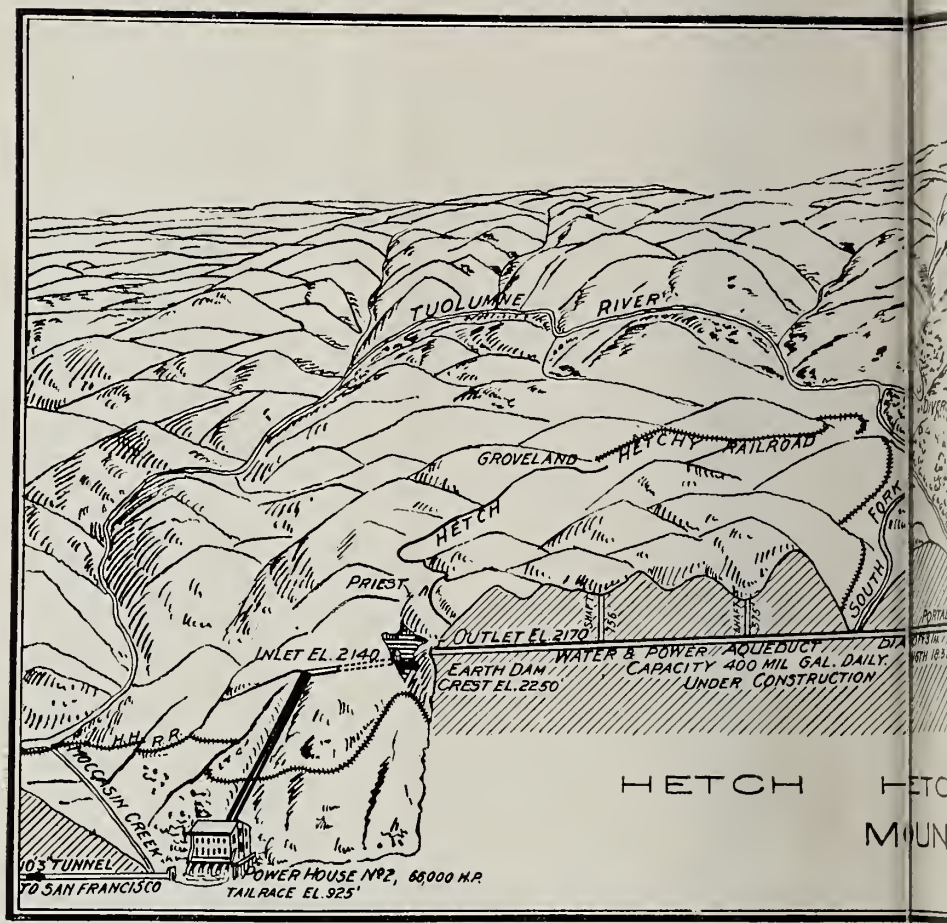
Program for the Future

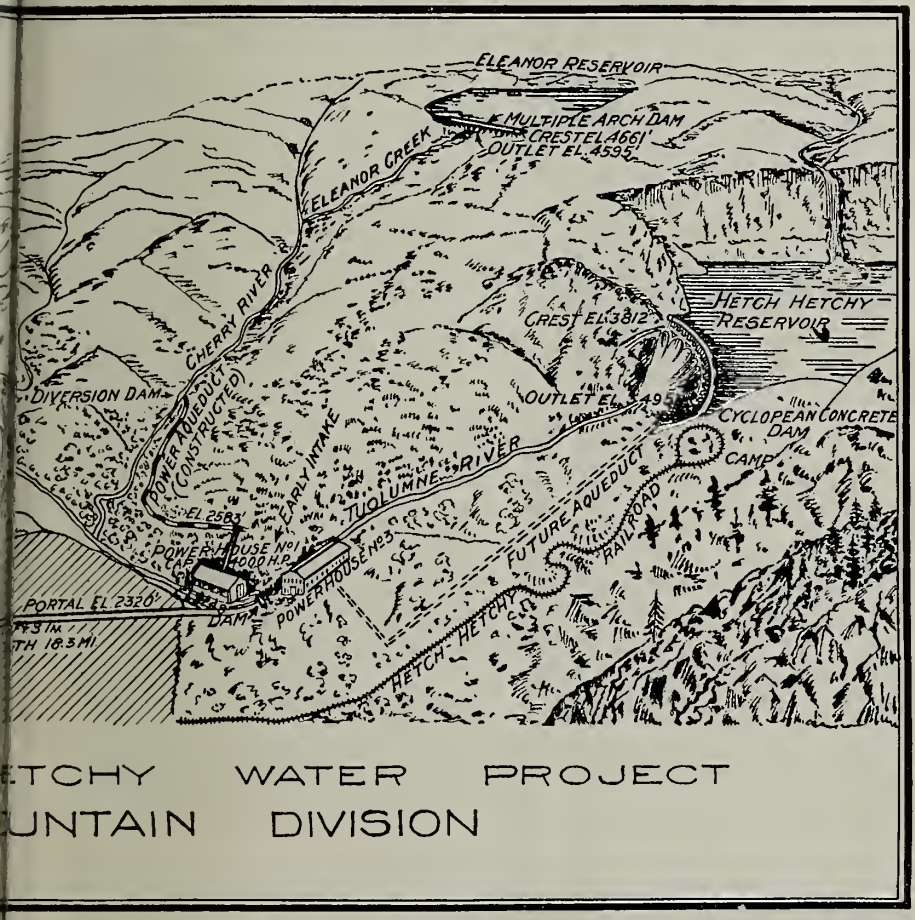
Construction of the aqueduct between Moccasin Creek and Alameda Creek will be pushed along as rapidly as necessary so that when the limit of the Calaveras supply is reached, Hetch Hetchy water will be ready.

The electric power development in the Sierra Nevada will be increased from time to time, by building additional plants as the market for power increases. The watershed controlled by the City covers 651 square miles, ranging in elevation from 3500 to 13,000 feet above sea level, and contains many valuable sites for power development.



View of Hetch Hetchy Dam, June 6, 1922, showing downstream face and top of concrete poured to that date. The lowest set of outlet conduits are shown set in place (lower center). The hollow square blocks setting on top of the dam are precast concrete sections of drainage wells. This illustration also shows the illumination of the dam for work at night.


TUOLUMNE RIVER
GROVELAND
HETCHY RAILROAD
HETCH
PRIEST
SOUTH FORK
INLET EL. 2140
OUTLET EL. 2170
EARTH DAM
CREST EL. 2250
WATER & POWER AQUEDUCT
CAPACITY 400 MIL GAL. DAILY.
UNDER CONSTRUCTION
H.H. R.R.
MOCCASIN CREEK
TUNNEL
TO SAN FRANCISCO
POWER HOUSE No 2, 68000 H.P.
TAIL RACE EL. 925'
HETCH



ETCHY WATER PROJECT
UNTAIN DIVISION

The Municipal Railway

The Municipal Railway of San Francisco has now been in successful operation for ten years and has passed beyond the realm of experiment. During this period the many trying problems of route location, construction of track, equipment and buildings, and developing a sane method of operation, have been solved and perfected to the satisfaction of the citizens of San Francisco who own the property.

It is possibly not appreciated by the average citizen that the San Francisco Municipal Railway is a pioneer undertaking and as such has attracted great attention from many quarters not only in the United States but in foreign countries. Without exception the comments have been most favorable.

The increase in population in San Francisco has been rapid, and from necessity a large portion of the growth of residential districts to accomomdate this increase has been on the outskirts of the section first settled. The use of the automobile has not only taken passengers from the street railways but further has hampered railway operation by congesting the streets, and in addition has put upon the railways a very considerable burden in the way of maintaining and improving the pavement within the railway right of way.

With the decreasing purchasing power of the nickel, the increasing demand for service, the shortening of the franchise life, and the demand for capital to make extensions, the railway situation in our cities has become very acute.

Urban railway transportation can best be supplied by a unified ownership giving uniform service to all sections of a city, providing universal transfers and financially capable

of constructing extensions in advance of actual necessity, thereby developing the city's growth in well ordered and predetermined directions. Municipal ownership and operation of street railways can most nearly fulfill all of these requirements. A municipality can finance more readily than a private corporation, and with reasonable efficiency in public office, can construct and operate as efficiently as a private corporation. The primary object of a private enterprise operating in the transportation field is pecuniary gain, while that of a municipal public utility is to give service.

Mileage of the System

The total mileage of street railways in San Francisco is 321 miles of single track, of which the Municipal Railway operates 65 miles, or 20 per cent of the total. This 65 miles includes five miles owned jointly by the Municipal Railway and the Market Street Railway Company; the other 60 miles is owned by the Municipal Railway.

The first line was put in operation in December, 1912. Construction progressed rapidly during the next two years, one compelling stimulus being the necessity for providing transportation facilities to the Panama-Pacific International Exposition. By the end of March, 1915, the lines in operation totaled 42.6 miles of single track.

The 65 miles of operated track includes 47 miles whose construction was financed from bond issues and 18 miles paid for out of earnings. The latter class embraces, among others, the Twin Peaks tunnel line and its connections west of the tunnel.

Cost

The lines and their equipment cost about $7,250,000, of which $5,750,000 was derived from bond issues and taxes and $1,500,000 from the earnings of the railway.

Nearly $1,250,000 of the road's earnings has been used for the retirement of bonds, leaving the net debt at present about $4,500,000.

West Portal Twin Peaks Tunnel.

This tunnel, 2.3 miles long, was constructed at an expense of over $4,500,000, to provide rapid transit from the business section to the southwest quarter of the City. It reduces the time for street car travel between the two districts by twenty minutes. Cars take only seven minutes to travel through the tunnel. Two stations give access from the surface for the benefit of residents of the districts between the two portals.

Equipment

The passenger-carrying rolling stock includes 218 cars, of which 168 are of semi-steel construction with seating capacity for 50 persons, 21 similarly modern cars seating 32 passengers, and nine automobile buses seating 19 passengers each. The cars are kept well painted and well cleaned, and their attractive appearance is one of the best advertisements of the efficiency of the Municipal Railway service. Twenty more of the 50-passenger cars are now under construction.

Car Barns

The two fireproof car barn buildings of reinforced concrete construction provide space not only for housing the cars and repairing and repainting them, but also offices for the superintendent and his staff, and recreation rooms for the platform men off duty.

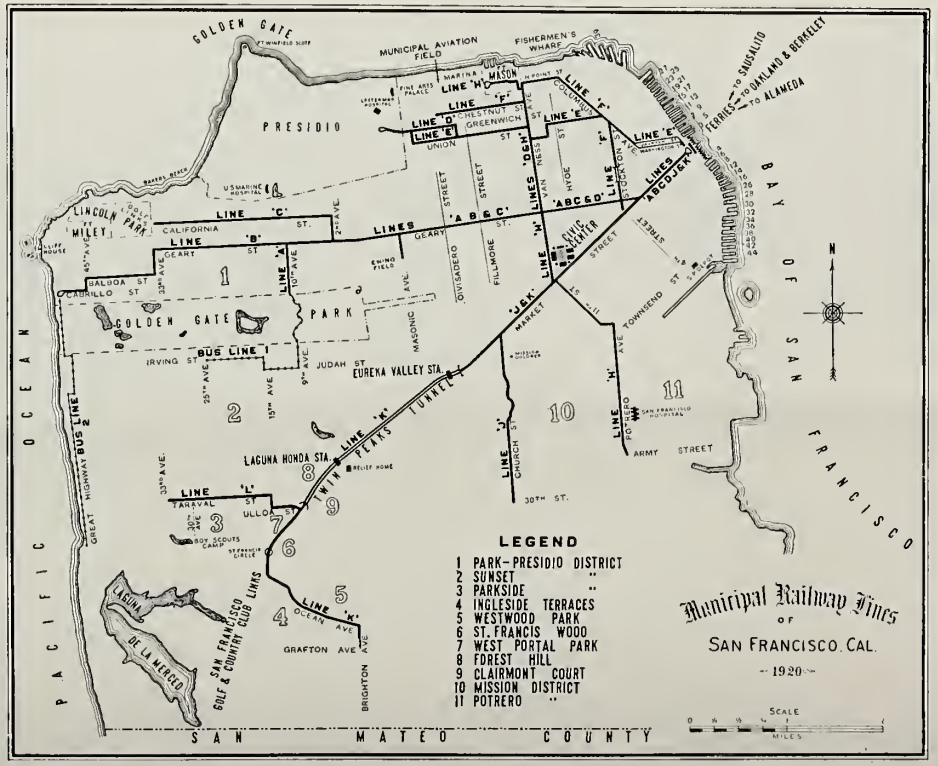
Statistics of Operation, Fiscal Year 1921–22

The following figures, which are subject to slight adjustments, show the results of operation for the fiscal year ending June 30, 1922:

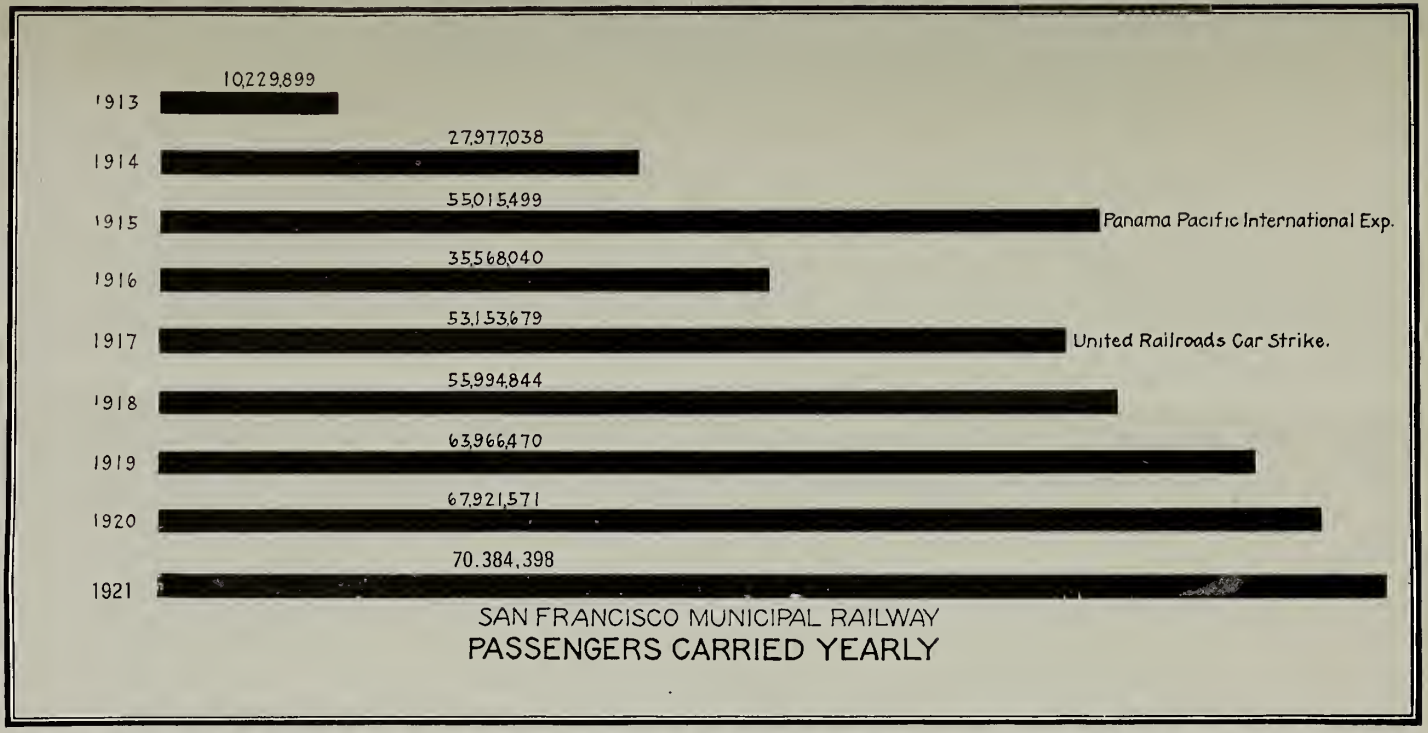
Passengers carried	70,757,908
Operating revenue	$2,896,115.60
Operating expenses	2,116,472.94
Depreciation reserve contribution	519,266.74
Compensation insurance	38,093.52
Bond interest	215,088.35

Motor Bus Lines

Two motor bus lines are operated, with nine buses running on regular schedules, giving service in districts where track construction is not yet warranted. The buses seat 19 passengers each. Transfers are issued between the buses and the car lines from whose terminals they operate across Golden Gate Park at Tenth Avenue and Fulton Street, and southerly along the beach from Cabrillo Street and Great Highway.



These lines cover 65 miles of single track. The total street railway track mileage in the City is 321 miles. The Municipal Railway mileage is 20 per cent of the total.



This diagram indicates the number of passengers carried on the lines of the Municipal Railway each year since the beginning of operation. The growth of traffic has been almost uniform from year to year, except in the year 1915, during which the Panama-Pacific International Exposition was held, and in 1917, when a large amount of business was temporarily diverted from the lines of the United Railroads (now the Market Street Railway Company) to the Municipal Railway by reason of a strike on the company's system.

Civic Improvements

HIGH PRESSURE FIRE PROTECTION SYSTEM

One of the lessons brought home to San Franciscans by the destruction by fire in 1906 of property valued at $325,000,000 was the need of an auxilary high pressure water supply system for fire protection, which has since been supplied at a cost of $5,750,000.

The system comprises the Twin Peaks Reservoir at an elevation of 750 feet with a storage capacity of 10½ million gallons; a 500,000 gallon steel tank situated on Clayton Street near Seventeenth Street at an elevation of 490 feet; a reinforced concrete tank of 750,000 gallons capacity at Jones and Sacramento Streets at an elevation of 360 feet; 74.5 miles of extra heavy cast-iron distributing mains ranging from 10 in. to 20 in. in diameter and connected to 912 hydrants; two pumping stations built on bedrock, one at Second and Townsend Streets and one at Fort Mason, with a combined capacity of 24,000 gallons per minute at 300 pounds pressure per square inch; 142 underground cisterns, 86 newly constructed and the balance repaired or reconstructed; two fire boats for the protection of the water front and shipping interests; and a new fire alarm system with a central fire alarm station in Jefferson Square.

Every practicable safeguard against damage by earthquake was incorporated into the design of this system. Heavy construction was used throughout. The pumping stations were established on solid rock, and each connected by two separate feeders to the distributing system. Gate valves at frequent intervals permit cutting out damaged sections of pipe. A special type of pipe joint gives added flexibility in the filled-in areas subject to settlement. The fire alarm station stands on a site isolated from other

structures and is provided with two independent sources of power.

SEWERAGE SYSTEM

The last 16 years has seen the reconstruction of San Francisco's sewer system in accordance with a comprehensive plan embracing the entire City. Previous to 1904 the sewerage system was unsanitary and inadequate and lacked co-ordination, while the design of the present system conforms to advanced sanitary engineering practice.

A separate system in which only domestic sewage flows provides for drainage from deep basements and a flow free from tidal influence in the low-level districts of the eastern portion of the City. This sewage flows to a concrete-lined sump located at Commercial and Drumm Streets, from which it is pumped into the mains emptying into the bay.

The greater area of the City is provided with the combined system, largely of reinforced concrete, which takes care of domestic sewage, storm water and ground water infiltration in the same sewers.

The 125 outlets of the old system, strewn promiscuously along the water front, have beeen replaced by five main outlets and ten relief storm water outlets. The locations of the main outlets were determined after thorough studies and observations of tidal currents along the shore line were made to insure against the return shoreward of the sewage. The ten storm relief outlet branches, carrying only the overflow in times of heavy rainfall, are located principally along the east and southeast shores.

The determination of the types and dimensions of the sewers involved the consideration of local rainfall runoff, area paved, roofed area, water consumption per capita, probable growth of population in each block of the City, and other factors.

The portion of the system constructed to date cost approximately $7,000,000 and to complete the contemplated extensions will require an additional $5,000,000. The system

is now complete to such a stage that, even at times of greatest storms and maximum runoff, no section of the City is flooded.

Some of the prominent features of the system are: (1) The high standard of construction; (2) the Mile Rock Tunnel, 9 feet by 11 feet, nearly a mile in length, passing under Sutro Heights and discharging the flow from the Sunset, Richmond and Ingleside Districts at the north shore; (3) at Forty-eighth Avenue and Fulton Street, the domestic sewage of these districts is pumped from a sump to Twenty-sixth Avenue and Fulton Street and then flows by gravity to the Bakers' Beach outfall, a submerged cast iron sewer extending 800 feet from the shore and discharging into the swift current of the Golden Gate; (4) the North Point Main, nearly six miles long, drains the easterly and southerly districts, originating at the summit in the Ocean View section as a small pipe structure and by successive stages tapering from a 2 ft. by 3 ft. egg-shaped to an 8 ft. 6 in. circular reinforced-concrete structure, with its outlet at the foot of Sansome Street; 1400 feet of this structure was constructed in tunnel under Sansome Street between Union and Pacific Streets (from this main most of the storm-water outlets receive their flow); (5) a three-compartment storm-water outlet from the North Point Main along Division Street, each compartment being 8 ft. 3 in. by 9 ft. 6 in.

TRAFFIC TUNNELS

The growth of traffic between the downtown section and the North Beach and West-of-Twin-Peaks residential districts led to the construction of the Stockton Street and the Twin Peaks tunnels to provide rapid transit for these districts.

The Stockton Street tunnel, costing approximately $650.-000, is 911 feet long and 50 feet wide, with a rise of 19 feet. It is the widest tunnel in the United States and accommodates a double-track street railway, vehicular traffic and two six-foot sidewalks.

The Twin Peaks tunnel is 25 feet wide, 20 feet high in the clear, and 2¼ miles in length, cost $4,750,000, and took 1000 days to build. It is the longest municipally-owned tunnel in the world. It accommodates the double-track Municipal Street Railway, which saves twenty minutes in time over the old route between Third and Market Streets and the districts west of the tunnel. Vehicular and pedestrian traffic are not provided for in this tunnel.

Funds for both these projects were raised by assessments levied upon the property benefited.

STREETS AND PAVEMENTS

In line with the plan to make San Francisco architecturally and structurally more attractive, the men in administrative circles in recent years have through well directed effort made their City one of the best paved and cleanest in the United States.

The rapid development and increasing popularity of motor vehicles for pleasure and commercial traffic have caused an evolution in street pavements.

The City has spent approximately $20,000,000 in reconstruction and in new street pavements. To meet the new demand, sheet asphalt was mostly constructed. Recently Topeka pavement has been adopted on account of its non-skidding properties. In the hilly districts brick is used, giving a clean, attractive, noiseless and good traction surface. Concrete pavements are being built on some of the steepest grades and narrow streets with light traffic.

Correction of the poorly laid out street system, principally due to rigid adherence to the gridiron method of blocks, has been made in many instances by applying special treatment in each individual case. Notable among these are the Hayes Street regrade, Leavenworth Street, the improvement of Francisco Street between Polk and Larkin Streets, the improvement of Cumberland and Sanchez Streets, Collingwood Street, Quesada Street, and Liberty and Sanchez Streets. Easier grades, attractive walls and terraces, mak-

Ocean Beach Esplanade and the Great Highway.

This construction will ultimately extend for three miles, along the entire length of the Great Highway or ocean beach boulevard.

ing districts easier of access, are the results of this procedure.

Concurrently with the campaign for better streets, a system of boulevards was mapped out, a large portion already constructed giving the City some of the most notable driveways in the world. The main traveled routes have been widened and paved and new routes have been opened. The Twin Peaks Boulevard, encircling those two hills at an elevation of 830 feet above sea level, forms a figure eight, from which magnificent panoramas of the bay, ocean and bay counties can be observed. The paving of the Great Highway affords an excellent marine drive, three miles in length. Point Lobos Avenue, around the bluffs of Sutro Heights, is the latest scenic drive to be improved.

Junipero Serra Boulevard, Sloat Boulevard, Great Highway, Corbett Road, Portola Drive, Nineteenth Avenue, Marina, Van Ness Avenue, Camino del Mar, San Bruno Avenue, Hunters Point Boulevard, Market Street Extension, Laguna Honda Boulevard, Twin Peaks Boulevard, Point Lobos Avenue, Army Street, Howard Street, Columbus Avenue are all units in the boulevard system already accomplished. Numerous other units, including Telegraph Hill Boulevard, the Skyline Boulevard, Bernal Cut Boulevard and the extension of the Marina are contemplated, which should, when completed, make the City a Mecca for the tourist and autoist.

PANAMA-PACIFIC EXPOSITION SITE

San Franciscans are to have more than the memory of the wonderful exposition of 1915, for besides the Palace of Fine Arts, Auditorium and other permanent features which have been preserved, about a mile frontage on the Bay of the grounds along the Marina, including that which was known as the North Garden, the Yacht Harbor, and the appurtenant lands, has become the property of the municipality and State, thanks to the leadership of the Exposition Company and the generosity of Exposition stockholders in giving to the City land valued at $400,000.

Upon the land made by the Exposition Company and the adjacent section to the south, an artistic residential tract has been laid out in such a way as to bring out prominently the portions of the Exposition which have been preserved. The Marina Boulevard, already partly constructed, will traverse the north end of this tract, and besides affording a pleasure drive between Fort Mason and the Presidio, will be of military value. The State-owned Belt Railway, serving the docks and Presidio, parallels this boulevard on the north. By means of parking and growth of shrubbery, it is planned to screen the railway from the residence tract to the south.

SPECIAL IMPROVEMENTS

Ocean Beach Esplanade

Proper protection of the beach and Great Highway against erosion is gradually being secured by construction of the Esplanade—a reinforced concrete sea wall and bleacher structure. A section 1740 feet in length is completed and another section 326 feet in length is now under construction. This Esplanade has attracted much favorable comment from engineers and other visitors from all over the world. Its utility is unquestioned and the soundness of design has been amply proven by the stability of the completed sections.

Convenience Station

A public comfort station has recently been completed at the Ocean Beach near the existing Esplanade. This is a large, commodious, underground structure, well lighted and well ventilated, and equipped with the most modern plumbing. Other such stations in various districts are soon to be constructed.

Aquatic Park

An area of two acres (with possibility of enlargement) fronting on San Francisco Bay and forming a natural cove, is being developed as an Aquatic Park for a public swimming tank and beach, boat houses and aquatic sports.

Point Lobos Avenue and the world-famed Cliff House and Seal Rocks.

Hetch Hetchy Reservoir as it will appear when the dam is completed and the reservoir filled with water.